LAND USE

HISTORIC LAND USE

The period from 7000 to 1000 B.C. gives the first evidence of Native American activity in the Ozark Region. These peoples lived in small, transient camps and survived mainly on animal foods. Native American groups flourished in the area during the Woodland period (100 B.C. to 900 A.D.), but still clung to their hunter-gatherer ways while the world around them changed. The rugged geography of the region allowed early Native Americans to continue their ways in the region for several hundred years beyond that of tribes on the fringe of the Ozarks, who began to settle in larger villages and use more plant food. Native American peoples during the early Mississippian period (A.D. 900 to 1200) created larger and more elaborate villages and relied more on farming for food. Native American culture disappeared from the region in a period from around A.D. 1200 to A.D. 1500. The main cause for this was a move of peoples to the large agricultural villages along the Mississippi River. During this period the Ozark region was used for seasonal hunting and the collection of flint. Following this decline, Osage tribes inhabited the area up to and during early European settlement (Jacobson and Primm 1994).

The Native Americans' most notable effect on the lands of the region was a result of their use of fire. Fires set by Native Americans are thought to have been significant in determining the plant distribution of the region. Some anthropologist believe that fires were set to improve grassland for grazing of large animals, aid in hunting, and harassment of enemies (Jacobson and Primm 1994).

The United States gained control of the Ozarks and the watershed in the Louisiana Purchase of 1803. The first Europeans settled the narrow valleys and built their homes near springs. The population of the rugged interior of the Ozarks grew more slowly than the surrounding areas, with emigrants coming from different ethnic groups. Many of the earliest pioneers were from

Kentucky and Tennessee and were attracted by the watershed's abundance of game and fish, rather than by its farming possibilities (Keefe and Morrow 1994).

The first changes in the landscape caused by land use patterns began taking place in the early 1800s to around 1880. Valley bottom forests and cane stands were replaced with cultivated fields and pastures. Suppression of wildfires in the uplands during the same period allowed an increase in understory growth in woodlands and losses of native grasslands and savannahs. The clearing of valley bottoms was probably responsible for some direct stream disturbance, but the suppression of fires in the uplands probably offset sediment yield (Jacobson and Primm 1994).

The second noticeable pattern in early land use was commercial timber harvest. Timber harvest on a large scale started around 1870 and continued until the 1920s. Shortleaf pines were harvested for sawlogs and oaks for railroad ties. The early logging operations used livestock to skid out the lumber, and cutting on the steeper slopes was avoided. This helped to minimize the effects of the early logging period (Jacobson and Primm 1994). The continued practice of valley clearing and road building coupled with extreme regional flooding between 1895 and 1915, was probably responsible for the initial moderate stream disturbance (Jacobson and Primm 1994).

The period between 1920 and 1960, known as the post-timber-boom, played the largest role in stream disturbances that are evident today. The practices of this period included annual burning and cutting of upland timber to open more grazing land, a practice still in place today. Oral-history indicates that small streams had more discharge, for longer periods, during this time than from 1960 to 1993. These changes in flow patterns can probably be attributed to changes in upland and riparian zone vegetation that decreased storage and flow resistance (Jacobson and Primm 1994).

During the early settlement period and throughout most of the timber boom, hogs were the dominant livestock in the area, only to be replaced by cattle following substantial increases in the 1920s and again in the 1940s. Early cattle were grazed on free range, which allowed them to concentrate in valley bottoms and destroy riparian vegetation and understory along streambanks. This destruction of riparian vegetation, coupled with the clearing and grazing of uplands, probably initiated headwater channel migrations, resulting in the extension of drainage networks and the accelerated release of gravel into small streams (Jacobson and Primm 1994). Free range was closed in the 1960's and areas were fenced. Fencing, along with improvements in the beef market, increased the areal density of cattle on pastures tremendously. The period from 1960 to 1993 showed decreases in the amount of farm land, but cattle numbers continued to increase (Jacobson and Primm 1994).

RECENT LAND USE

Forest land comprises the greatest percentage of land use/land cover types in the watershed at an estimated 57.2%, followed by pasture land (27.2%), range land (5.4%), noncultivated cropland (3.2%), urban (2.7%), water (1.6%), roads (1.5%), miscellaneous (1.4%), and cultivated cropland

(0.2%) (Tables LU01, LU02, and LU03) (Barney, T., NRCS, pers. comm.). Land use/land cover for the Missouri portion of the watershed from 1997 figures was: deciduous forest (36.8 %), mixed forest (24.4%), (total forest cover 61.2%), grassland (31.0%), water (3.9%), cropland (2.4%), and urban (1.5%) (Figure LU01). The 1997 land use/land cover data is Phase 1 data from the Missouri Resource Assessment Partnership (MoRAP 1997). The MoRAP land cover project is ongoing, and the Phase I map is an interim product designed for limited use. Phase 2 will incorporate extensive ground-based information, and is scheduled to be completed during 1999.

Livestock accounts for greater than 75% of agricultural sales in all Missouri counties in the watershed. Barry County lead all Missouri counties, statewide, in 1992 with a total market value for agriculture of 95 million dollars. The majority of the Barry County sales were from poultry production followed by cattle production (MASS 1997).

Southwest Missouri, including portions of the watershed, is one of the largest cattle producing regions in the state. Figures from 1997 indicate that all watershed counties, except Stone and Taney, had 60,000 or more head of cattle. In 1997, Barry, Wright, and Webster counties were the number seven, eight, and nine counties in the state for numbers of beef cattle. These counties compromise approximately 10% of Missouri's portion of the watershed. Cattle numbers are recorded annually nationwide on a county basis. In order to generate cattle numbers at a watershed level, the amount of watershed area included in a particular county first had to be calculated. This method is only good to the point that it considers cattle to be equally spaced throughout the county. There were an estimated 141,340 (3.3% of state total) cattle in the Missouri portion of the watershed on January 1, 1997 (MASS 1997).

Historic and active mining have been and are present throughout the watershed (Table LU04). Lead was the most common mineral historically mined throughout the watershed, but no lead mining is ongoing today. There were historically sixty-three active lead mines and fifteen exploratory lead prospects in the watershed (MDNR 1998a). Mining operations are concentrated, and the effects of these operations have potential to impact watershed streams. Sand and gravel mining are the most common type of active mines. There are currently ninety known gravel removal locations in the watershed, fifty in Missouri and forty in Arkansas (Table LU05, Figure LU02) (USCOE 1998). The largest number of active gravel removal locations in the Missouri portion of the watershed occurs in the Beaver Creek subwatershed. Most sand and gravel operations are located directly adjacent to stream channels, and have the most potential for disturbing aquatic life.

Seasonal closures on the excavation of sand and gravel were placed on four stream reaches under General Permit GP-34M issued by the USCOE.

These reaches are:

> Beaver Creek, 23 miles, from mouth to Highway 76 bridge at Bradleyville (T24N, R18W, S10), Taney County, closed March 15 to July 31;
>
> Swan Creek, 2.3 miles, from Bull Shoals Lake (T24N, R20W, S33) to COE boundary (T24N, R20W, S33), Taney County, closed March 15 to June 15;
>
> Little North Fork, 4.2 miles, from Bull Shoals Lake (T22N, R15W, S19) to COE boundary (T22N, R15W, S04), Ozark County, closed March 15 to June 15;
>
> Pond Fork, 3 miles, from Bull Shoals Lake (T22N, R15W, S19) to COE boundary (T22N, R16W, S1), Ozark County, closed March 15 to June 15.

At the time of this writing, these restrictions no longer apply.

There are currently nineteen limestone quarries operating in the Missouri portion of the watershed (Table LU06, Figure LU03). These facilities are regulated by the Missouri Department of Natural Resources (MDNR) and must meet air and discharge standards. These operations have the potential to negatively affect water quality by discharging lime to surface and ground water (MDNR 1998b).

WATERSHED POPULATION

The total (MO and AR) watershed human population in 1990 was 177,233 which is an increase of 12.0% from 1980 figures. Nineteen of the twenty counties that are partially or fully in the watershed have shown population increases from 1990 to 1996.

The majority of population growth in the Missouri portion of the watershed can be attributed to urban sprawl from the Springfield area and booming tourism associated with the Branson-Table Rock Lake region. Christian (44%), Stone (40%), and Taney (33%) counties were the top three counties for growth by percent in Missouri from 1990 to 1997, and these counties are projected to remain in the top ten Missouri counties for growth between 1990 and 2020. Six of the eight Missouri counties associated with the watershed are estimated to have population increases at rates higher than the state average (9%) through the year 2020 (Table LU07, Table LU08). The population of Christian County is expected to nearly double in the period from 1990 to 2020. The watershed towns of Hollister (3rd) and Branson (4th) also made the top 10 list for population increase for towns of over 2,500 people (Missouri State Office of Administration 1998).

Northwestern Arkansas has, in a period from 1970-1985, had the largest percentage population increase in the state. The watershed's Arkansas counties that lie along the Missouri border have shown increases between 39% and 95% for this time period. All counties in the Arkansas portion of the watershed, with the exception of one, have had population increases between 23% to 95% in this time period (Table LU09) (U.S. Census Bureau 1998).

Although some of these counties are not totally included in the watershed, the conclusion can be drawn that in areas where county populations have increased, so too has the watershed population. These ever-continuing population increases will put more demand on water resources and become an added threat to the water quality of the region, especially in the Bull and Swan Creek subwatersheds (Christian County) and the areas influencing Table Rock Lake and Lake Taneycomo.

The majority of the Missouri watershed is rural with a population density of 34.2 people per mi^2. The Missouri state average is 64.8 people per mi^2. Higher population densities occur in the Table Rock-Taneycomo region in Missouri and the Beaver Lake region in northwest Arkansas.
Larger metropolitan areas in the watershed, based on the 1990 U.S. census figures, include Branson, MO (11,364), Ava, MO (2,938), Hollister, MO (2,628), Kimberling City, MO (1,590) Forsyth, MO (1,161), Harrison, AR (9,922), Berryville, AR (3,212,) Green Forest, AR (2,050), Eureka Springs, AR (1,900), and West Fork, AR (1,607) (U.S. Census Bureau 1998).

SOIL CONSERVATION AND WATERSHED PROJECTS

There are currently no PL 566 or SALT projects in the Missouri portion of the White River watershed.

PUBLIC AREAS

Public areas in the Missouri portion of the watershed are numerous and managed by several state and federal agencies (Table LU10, Figure LU04). The Drury-Mincy Conservation Area (CA) is the largest (5,699 acres) area owned and managed by the Missouri Department of Conservation (MDC) in the watershed. MDC owns and manages 18,783 acres with additional management responsibility on 18,625 acres of land owned by the United States Army Corps of Engineers (USCOE) (Houf, L., MDC, pers. comm.). Plans have also been developed for two additional MDC access sites on Lake Taneycomo. The Cooper Creek Access will add a 29.4-acre access to Lake Taneycomo in Taney County. A lease agreement was signed in 1996 between MDC and Empire District Electric Company (EDEC) to develop land adjacent to Boston Ferry Conservation Area into an additional access. Ownership issues concerning the 1.77-acre addition have put this project on hold. A third access site on Lake Taneycomo, Empire Park Access, was recently upgraded as part of a Corporate and Agency Partnership Program (CAPP) agreement between MDC and EDEC.

The United States Forest Service (USFS) has responsibility for the management of the Mark Twain National Forest in Missouri, with a watershed-wide total of 186,253 acres of public land. Forest Service land is managed in two units, the Cassville Ranger Unit (45,028 acres), with responsibility for the western portion of the watershed and the Ava Ranger Unit (141,225 acres), with responsibility for the eastern portion of the watershed. The Hercules Glade Wilderness (12,315) is located within the Ava Ranger Unit.

The Missouri Department of Natural Resources (MDNR) has management responsibility for the lands in Roaring River State Park (3,403 acres) and Table Rock State Park (356 acres).

The Arkansas Game and Fish Commission (AG&FC) manages 25,173 acres in that state's portion of the watershed. The USFS manages 5,000-7,000 acres in the upper White River as part of the Ozark National Forest. There are three state parks in the Arkansas portion of the watershed managed by the Arkansas Department of Parks and Tourism (Table LU11, Figure LU05).

The USCOE owns 98,684 acres of land surrounding the three large lakes in the watershed; Beaver Lake (12,256), Table Rock Lake (24,102), Bull Shoals Lake (62,326). The majority of the land remains under the control of the USCOE and is open to the public. Some USCOE land has been leased to other state, federal, and local agencies. A small amount of USCOE land is leased to individuals for their personal use (Milholland, M., USCOE, pers. comm.).

CORPS OF ENGINEERS JURISDICTION

The White River watershed is under the jurisdiction of the Little Rock District of the USCOE. Permits issued under Section 404 of the Federal Clean Water Act are required to conduct many instream activities. Applications for Section 404 permits should be directed to the Little Rock office. In addition, current listings of Section 404 permits are available from the Little Rock USCOE District Office:

Little Rock District
Corps of Engineers
P.O. Box 867
Little Rock, AR 72203-0867
Phone: (501)324-5295

Table LU01. Land use/cover for the Missouri portion of the White River watershed.

Land Use/ Cover	1992 estimate (acres)	1992 (%)	1987 estimate (acres)	1987 (%)	1982 estimate (acres)	1982 (%)
Cultivated Cropland	2,300	0.2	3,800	0.3	5,800	0.5
Noncultivated Cropland	39,400	3.1	33,400	2.6	29,000	2.3
Federal Land[1]	230,700	18.1	230,700	18.1	229,900	18.0
Forested Land	470,100	36.9	465,600	36.5	464,500	36.4
Pasture Land	333,600	26.2	346,700	27.2	358,700	28.1
Range Land	66,200	5.2	66,200	5.2	66,700	5.2
All Roads and Railroads	18,100	1.5	17,700	1.4	17,600	1.4
Urban	32,700	2.6	29,000	2.3	23,000	1.8
Large Water[2]	66,197	5.2	66,197	5.2	66,197	5.2
Small Water[3]	2,000	0.2	2,000	0.2	2,000	0.2
Miscellaneous	13,600	1.1	13,500	1.1	11,400	0.9

[1] No land use/cover types have been indicated for federal land. The major Corps of Engineer reservoirs have been added into the large water category but have not been subtracted from the Federal land total, so some overlap does occur.
[2] Indicates streams ≥660 feet wide and lakes ≥40 acres.
[3] Indicates streams < 660 feet wide and lakes < 40 acres.
Source: (Barney, T., NRCS, pers. comm.).

Table LU02. Land use/cover for the Arkansas portion of the White River watershed.

Land Use/Cover	1992 estimate acres	1992 (%)	1987 estimate acres	1987 (%)	1982 estimate acres	1982 (%)
Cultivated Cropland	0	0.0	2,700	0.1	0	0.0
Noncultivated Cropland	12,100	0.6	18,000	0.9	15,400	0.8
Federal Land[1]	120,000	5.8	112,700	5.5	112,300	5.5
Forested Land	913,200	44.5	914,100	44.4	914,900	44.6
Pasture Land	772,800	37.6	783,300	38.0	798,800	38.9
Range Land	58,400	2.8	54,200	2.6	54,300	2.6
All Roads and Railroads	28,400	1.4	28,200	1.4	26,100	1.3
Urban	56,200	2.7	55,500	2.7	44,000	2.1
Large Water[2]	67,400	3.3	67,400	3.3	66,700	3.3
Small Water[3]	7,400	0.4	7,400	0.4	7,300	0.4
Miscellaneous	17,400	0.9	15,900	0.8	13,000	0.6

[1] No land use/cover types have been indicated for federal land. The major Corps of Engineer reservoirs have been added into the large water category but have not been subtracted from the Federal land total, so some overlap does occur.
[2] Indicates streams ≥ 660 feet wide and lakes ≥ 40 acres.
[3] Indicates streams < 660 feet wide and lakes < 40 acres.
Source: (Barney, T., NRCS, pers. comm.).

Table LU03. Land use/cover for the entire White River watershed.

Land Use/Cover	Estimated acres	(%)	MO acres (%)*	AR acres (%)*
Cultivated Cropland	2,300	0.1	2,300 (100.0)	0 (0.0)
Noncultivated Cropland	51,500	1.5	39,400 (76.5)	12,100 (23.5)
Federal Land[1]	350,700	10.5	230,700 (65.8)	120,000 (34.2)
Forested Land	1,383,300	41.6	470,100 (34.0)	913,200 (66.0)
Pasture Land	1,106,400	33.2	333,600 (30.2)	772,800 (69.8)
Range Land	124,600	3.7	66,200 (53.1)	58,400 (46.9)
All Roads and Railroads	46,500	1.4	18,100 (38.9)	28,400 (61.1)
Urban	88,900	2.7	32,700 (36.8)	56,200 (63.2)
Large Water[2]	133,597	4.0	66,197 (49.5)	67400 (50.5)
Small Water[3]	9,400	0.3	2,000 (21.3)	7,400 (78.7)
Miscellaneous	31,000	0.9	13,600 (43.9)	17,400 (56.1)

***The percent shown indicates that state's percentage of land use/cover represented in the entire watershed. Total land percentages for the basin are Missouri (44%) and Arkansas (56%).**

[1] No land use/cover types have been indicated for federal land. The major Corps of Engineer reservoirs have been added into the large water category but have not been subtracted from the Federal land total, so some overlap does occur.

[2]Indicates streams $\geq$ 660 feet wide and lakes $\geq$ 40 acres.

[3]Indicates streams < 660 feet wide and lakes < 40 acres.

Source: (Barney, T., NRCS, pers. comm.).

Table LU04. Historic and active mine types found in the Missouri portion of the White River watershed, by county.

Commodities	B*	C*	D*	O*	S*	T*	We*	Wr*	Total
Lead	0	19	0	0	2	2	0	0	23
Lead/Zinc	2	26	0	0	1	11	0	4	44
Lead/Zinc/Iron	1	0	0	1	1	3	0	0	6
Lead/Copper	0	2	0	0	0	0	0	0	2
Lead/Copper/Zinc	0	1	0	0	0	0	0	0	1
Lead/Silver	0	0	1	0	0	0	0	0	1
Zinc	0	1	0	0	0	0	0	0	1
Iron	0	0	2	2	0	3	0	0	7
Iron/Lime	1	0	1	4	0	0	0	0	6
Iron/Copper	1	0	0	0	0	0	0	0	1
Iron/Pyrite	2	0	0	0	0	0	0	0	2
Limestone	0	0	0	0	0	2	0	0	2
Limestone CB	11	3	7	2	2	10	0	0	35
Sand/Gravel	4	4	5	6	0	18	0	0	37
Uranium	2	1	1	0	0	0	0	0	4
TOTAL	24	57	17	15	6	49	0	4	172

*** B= Barry, C= Christian, D= Douglas, O= Ozark, S= Stone, T= Taney, We= Webster, Wr= Wright.**
Source: MDNR (1998a).

Table LU05. Known gravel removal locations in the White River watershed.

Site #	County	Stream name	Location T R S
10	Barry	Owl Creek	21N 25W 20
09	Barry	Roaring River	21N 26W 09
03	Barry	Roaring River	21N 26W 09
04	Barry	Kings River	21N 25W 24
05	Barry	Kings River	21N 25W 24
06	Barry	Roaring River	21N 26W 04
25	Christian	Bull Creek	25N 21W 36
38	Christian	Swan Creek	26N 19W 34
27	Christian	Bull Creek	25N 20W 08
48	Christian	Swan Creek	26N 19W 12
33	Douglas	Beaver Creek	27N 17W 23
36	Douglas	Cowskin Creek	27N 16W 33
34	Douglas	Beaver Creek	27N 17W 23
39	Douglas	Little Beaver	25N 18W 22
45	Ozark	North Fork	22N 15W 13
44	Ozark	Barren Fork	23N 15W 34
43	Ozark	North Fork	22N 15W 13
42	Ozark	Little North Fork	24N 16W 24
19	Ozark	Little N. Fork White River	22N 15W 08
41	Ozark	Pond Fork	23N 16W 26
40	Ozark	Pond Fork	23N 16W 35
22	Ozark	Barren Fork	23N 15W 33
46	Ozark	North Fork	22N 15W 13
12	Ozark	Little N. Fork White River	22N 15W 05
26	Ozark	Barren Fork	23N 15W 33
07	Stone	Big Indian Creek	21N 24W 15
02	Stone	Big Indian Creek	21N 24W 15
08	Stone	Big Indian Creek	21N 24W 15
11	Stone	Big Indian Creek	21N 24W 22
01	Stone	Big Indian Creek	21N 24W 22
31	Taney	Beaver Creek	24N 17W 06
32	Taney	Swan Creek	24N 20W 34
30	Taney	Beaver Creek	23N 18W 06
29	Taney	Bull Creek	24N 21W 34
35	Taney	Beaver Creek	24N 18W 21
28	Taney	Roark Creek	23N 22W 23
37	Taney	Silver Creek	23N 20W 09
24	Taney	Turkey Creek	22N 21W 09
23	Taney	Bull Creek	24N 21W 11
21	Taney	Swan Creek	27N 20W 34
20	Taney	Swan Creek	24N 20W 34
18	Taney	Swan Creek	24N 20W 34
17	Taney	Swan Creek	24N 20W 34
16	Taney	Beaver Creek	23N 19W 14

Table LU05. Known gravel removal locations (continued).

Site #	County	Stream name	Location T R S
15	Taney	Shoal Creek	21N 17W 05
14	Taney	Swan Creek	23N 20W 34
47	Taney	Swan Creek	24N 20W 01
13	Taney	Swan Creek	23N 20W 27
49	Taney	Beaver Creek	24N 18W 02
50	Taney	West Fork Big Creek	22N 17W 13
51	Baxter	White River	19N 14W 19
52	Boone	Bear Creek	20N 20W 22
53	Boone	Bear Creek	20N 21W 36
54	Boone	Cricket Creek	21N 21W 20
55	Boone	Evans Branch	20N 20W 26
56	Boone	Sugarloaf Creek	20N 18W 06
57	Boone	Deshield Fork	20N 18W 04
58	Carroll	Yocum Creek	21N 22W 19
59	Carroll	Butler Creek	21N 27W 14
60	Carroll	Table Rock Lake	21N 26W 17
61	Carroll	Osage Creek	20N 25W 21
62	Carroll	Kenner Creek	18N 23W 27
63	Carroll	Kenner Creek	18N 23W 27
64	Madison	West Flemming Creek	13N 26W 18
65	Madison	Kings River	25W 19N 29
66	Madison	Kings River	16N 24W 09
67	Madison	Kings River	16N 24W 32
68	Madison	White River	13N 26W 04
69	Madison	White River	13N 26W 04
70	Madison	White River	13N 26W 04
71	Madison	White River	13N 26W 04
72	Madison	Thomas Creek	14N 27W 04
73	Madison	Kings River	15N 24W 05
74	Madison	White River	14N 28W 11
75	Madison	White River	13N 27W 02
76	Madison	Richland Creek	16N 28W 36
77	Madison	War Eagle Creek	18N 26W 32
78	Marion	Crooked Creek	18N 17W 07
79	Marion	Tar-Kiln Creek	19N 18W 26
80	Marion	East Horton Creek	20N 18W 10
81	Marion	Sugarloaf Creek	20N 17W 19
82	Marion	Crooked Creek	19N 15W 33
83	Marion	Crooked Creek	18N 16W 08
84	Marion	Crooked Creek	18N 16W 08
85	Washington	Shumate Creek	15N 28W 33
86	Washington	West Fork White River	15N 30W 29
87	Washington	Middle Fork White River	15N 29W 28
88	Washington	Richland Creek	17N 28W 31
89	Washington	White River	17N 28W 30
90	Washington	West Fork White River	15N 30W 16

Source: USCOE (1998).

Table LU06. Permitted limestone quarries in the Missouri portion of the White River watershed.

Site #	Name	Receiving Water	Location	County
01	Hutchens Construction	Dry Hollow	22N 28W 34	Barry
02	Hutchens Eagle Rock	Roaring River	21N 26W 05	Barry
03	Barry County Ready Mix	Panther Creek	21N 26W 24	Barry
04	Shell Knob Quarry	Big Creek	22N 25W 04	Barry
05	Barry County Ready Mix	Mill Creek	22N 25W 04	Barry
06	L-J Hwy. 376 Quarry	Fall Creek	23N 22W 34	Taney
07	Table Rock Asphalt	East Fork Roark Creek	23N 22W 11	Taney
08	Roark Creek Quarry	Roark Creek	23N 21W 19	Taney
09	Kortes Quarry	Bee Creek	23N 21W 07	Taney
10	Glenstone Block Company	Roark Creek	23N 21W 19	Taney
11	Table Rock Asphalt #1	Roark Creek	23N 21W 19	Taney
12	L-J Hollister South	Turkey Creek	22N 21W 30	Taney
13	Concrete of the Ozarks	Turkey Creek	22N 21W 17	Taney
14	Mansfield 76 Quarry	Lake Taneycomo	22N 21W 02	Taney
15	Tom's Quarry	Lake Taneycomo	22N 21W 01	Taney
16	L-J Hilda Quarry	Slough Hollow	23N 19W 25	Taney
17	L-J Protem Site 12	Bull Shoals Lake	21N 17W 16	Taney
18	L-J Gainesville Quarry	S. Fork Bratten Spring Cr.	22N 14W 16	Ozark
19	L-J Ava Quarry	Spring Creek	26N 16W 25	Douglas

Source: MDNR (1998a).

Table LU07. Total county populations and estimated changes for Missouri counties that include portions of the White River watershed.

County	1990 Pop.	1995 Pop.	2000 Est.	2005 Est.	2010 Est.	2015 Est.	2020 Est.
Barry	27,547	29,315	31,033	32,682	34,227	35,701	37,029
Christian	32,644	38,433	44,037	49,458	54,633	59,462	63,799
Douglas	11,876	11,909	11,950	12,021	12,100	12,188	12,280
Ozark	8,598	8,862	9,082	9,238	9,295	9,284	9,184
Stone	19,078	21,196	23,168	24,963	26,493	27,780	28,733
Taney	25,561	28,205	30,576	32,729	34,622	36,159	37,231
Webster	25,239	25,239	26,690	28,130	29,517	30,821	31,993
Wright	17,054	17,054	17,387	17,740	18,121	18,504	18,887
Total	165,815	180,213	193,923	206,961	219,008	229,899	239,136

Source: Missouri State Office of Administration (1998).

Table LU08. Projected population increases in Missouri counties that include portions of the White River watershed. Values for each county and year are in comparison to 1990 population levels (Table LU07).

	PERCENT INCREASE BY YEAR					
County	1995	2000	2005	2010	2015	2020
Barry	6.4	12.7	18.6	24.3	29.6	34.4
Christian	17.7	34.9	51.5	67.4	82.2	95.4
Douglas	0.3	0.6	1.2	1.9	2.6	3.4
Ozark	3.1	5.6	7.4	8.1	8.0	6.8
Stone	11.1	21.4	30.9	38.9	45.6	50.6
Taney	10.3	19.6	28.0	35.5	41.5	45.7
Webster	6.3	12.4	18.4	24.3	29.8	34.7
Wright	1.8	3.8	5.9	8.1	10.4	12.7
Average	8.7	17.0	24.8	32.1	38.7	44.2

Source: Missouri State Office of Administration (1998).

Table LU09. Populations and estimated changes for Arkansas counties that include portions of the White River watershed.

County	1990 Pop.	Change (%)	1994 Pop.	Change (%)	1996 Pop.	1990-96 Change (%)
Benton	97,499	+7.7	105,588	+12.7	120,932	+19.4
Carroll	18,654	+4.4	19,505	+11.1	21,933	+15.0
Washington	113, 409	+5.6	120,146	+8.8	131,708	+13.9
Marion	12,001	+3.6	12,444	+10.2	13,855	+13.4
Baxter	31,186	+3.6	32,362	+9.3	35,666	+12.6
Crawford	42,498	+4.4	44,446	+7.6	48,100	+11.7
Johnson	18,221	+2.5	18,695	+8.8	20,508	+11.2
Madison	11,618	+5.8	12,330	+4.7	12,943	+10.2
Boone	28,297	+3.1	29,207	+6.9	31,364	+6.6
Franklin	14, 897	+1.6	15,139	+6.1	16,121	+7.6
Newton	7,666	-0.2	7,649	+4.3	7,989	+4.0
Searcy	7,841	-3.6	7,562	+0.8	7,626	-2.8

Source: U.S. Census Bureau (1998).

Table LU10. Public areas in the Missouri portion of the White River watershed.

Area name	Management[1]	County	Acres	Stream Frontage	Impoundment acres
Roaring River State Park	MDNR	Barry	3,403	7.5 mi.	
Roaring River CA	MDC	Barry	439	0.5 mi.	
Roaring River Fish Hatchery	MDC	Barry	3		
Busiek State Forest	MDC	Christian	2,505	4.5 mi.	
Grundy Memorial WA	MDC	Douglas	40		
Squires Towersite	MDC	Douglas	5		
Caney Mountain CA	MDC	Ozark	7,882		
Wilderness Towersite	USFS	Stone	2		
Ruth and Paul Henning CA	MDC	Taney/Stone	1,534	0.5 mi.	
Shepard of the Hills Fish Hatchery and Visitor Center	MDC	Taney	211		
Hollister Towersite	MDC	Taney	180		
Boston Ferry CA	MDC	Taney	180		
Hilltop Towersite	MDC	Taney	3		
Drury-Mincy CA	MDC	Taney	5,699		
Branson MDC Office	MDC	Taney	4		
Cedar Creek Towersite	MDC	Taney	4		
Cooper Creek Access	MDC/EDEC	Taney	29		
Bull Shoals Lake*	MDC/USCOE	Various	62,326		45,440
Lake Taneycomo	MDC/USCOE	Taney			2,080
Empire Park	EDEC/MDC	Taney	3		
Table Rock Lake*	USCOE/MDC	Various	24,102		43,100
Table Rock State Park	MDNR	Taney	356		
Hercules Glades Wilderness	USFS	Taney	12,315		
Mark Twain National Forest	USFS	Numerous	186,253		

*Numbers indicate both Missouri and Arkansas portions of area and impoundment acres.

[1]Management responsibility- MDC = Missouri Department of Conservation; MDNR = Missouri Department of Natural Resources; EDEC = Empire District Electric Company; USCOE = United States Army Corps of Engineers; USFS = United States Forest Service.

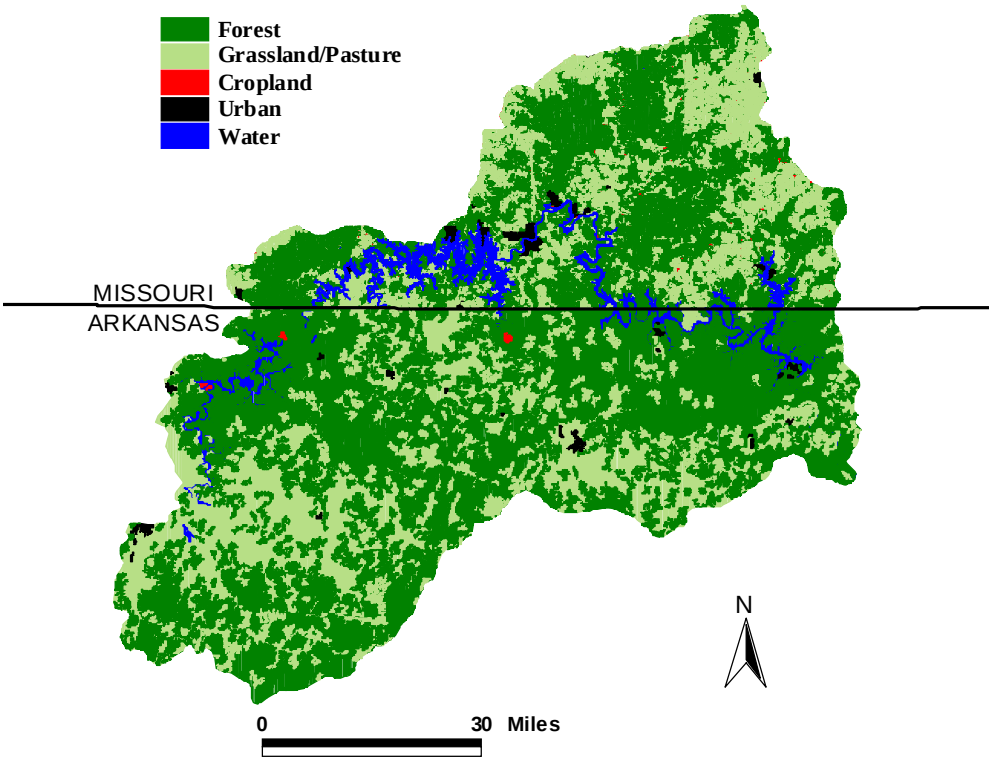
Table LU11. Public areas in the Arkansas portion of the White River watershed.

Area Name	County	Acres	Management Responsibility	Stream access
Wildcat Shoals Access	Baxter	2	AG&FC	X
Beaver Lake State Park Hobbs State Mgmt. Area	Benton	11,646	AG&FC, AR Dept. of Parks and Tourism, AR Natural Heritage Comm.	
Bull Shoals Nursery Pond	Boone	NA[1]	AG&FC	
Houseman Access	Carroll	NA[1]	AF&FC	X
Withrow Springs State Park	Carroll	780	AR Dept. of Parks and Tourism	X
Hindsville Lake	Madison	1	AG&FC	
Madison County WMA*	Madison	13,287	AG&FC	X
Marble Access	Madison	1	AG&FC	X
Ozark National Forest	Madison	6,000	USFS	X
Rock House Access	Madison	23	AG&FC	X
Bull Shoals State Park	Marion	660	AR Dept. of Parks and Tourism	X
Crooked Creek Access	Marion	2	AG&FC	X
Marion County WMA*	Marion	120	AG&FC	X
Pot Shoals Net Pen Proj.	Marion	90	AG&FC	
Ranchette Access	Marion	1	AG&FC	X
Marion County Access	Marion	NA[1]	AG&FC	X
White Hole Access	Marion	NA[1]	AG&FC	X

*Wildlife Management Area

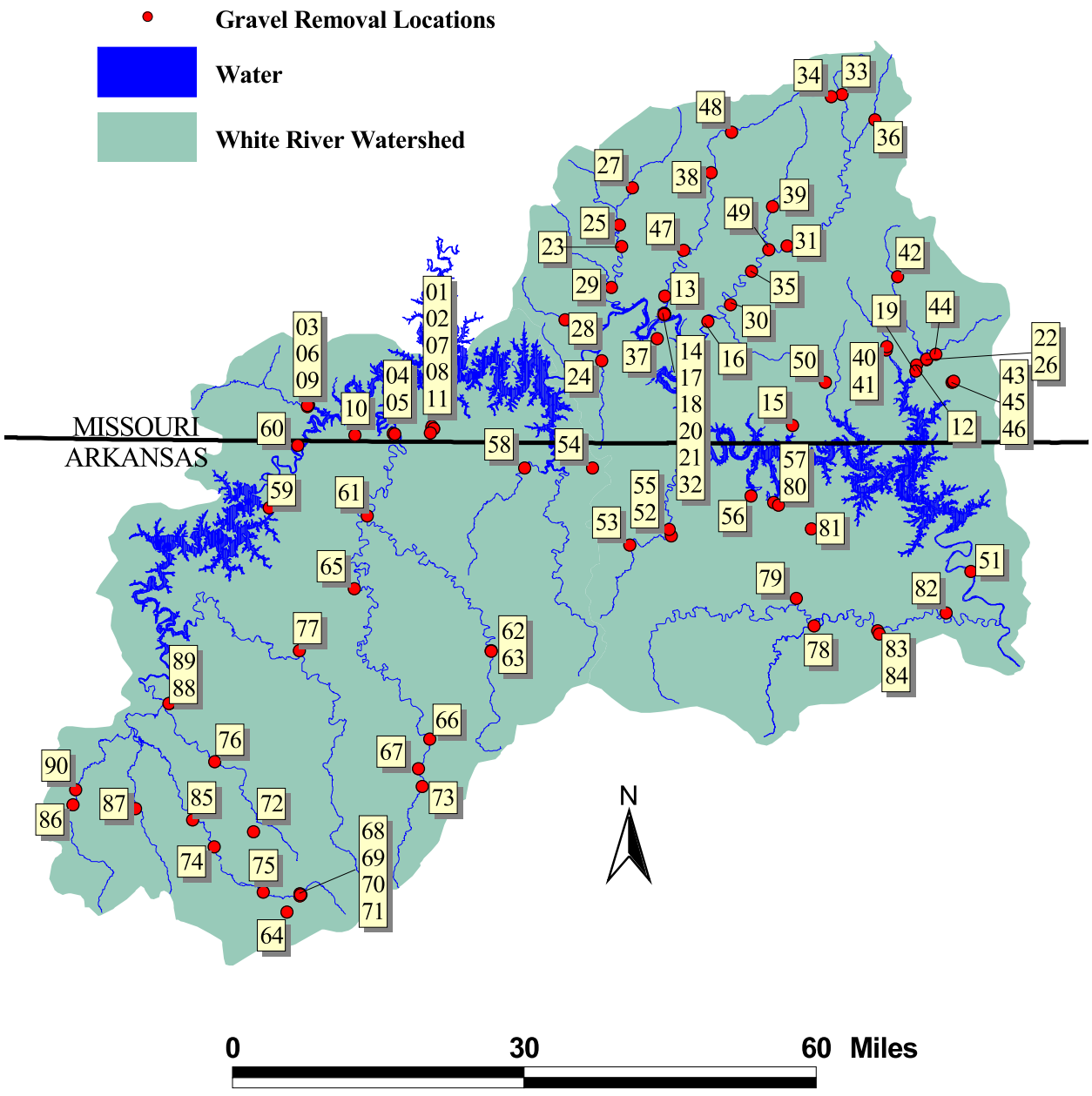
[1]NA indicates that no area was reported at these areas.

Figure LU01. Land use/cover of the White River watershed .



Source: (MoRAP 1997, Smith et al. 1998).

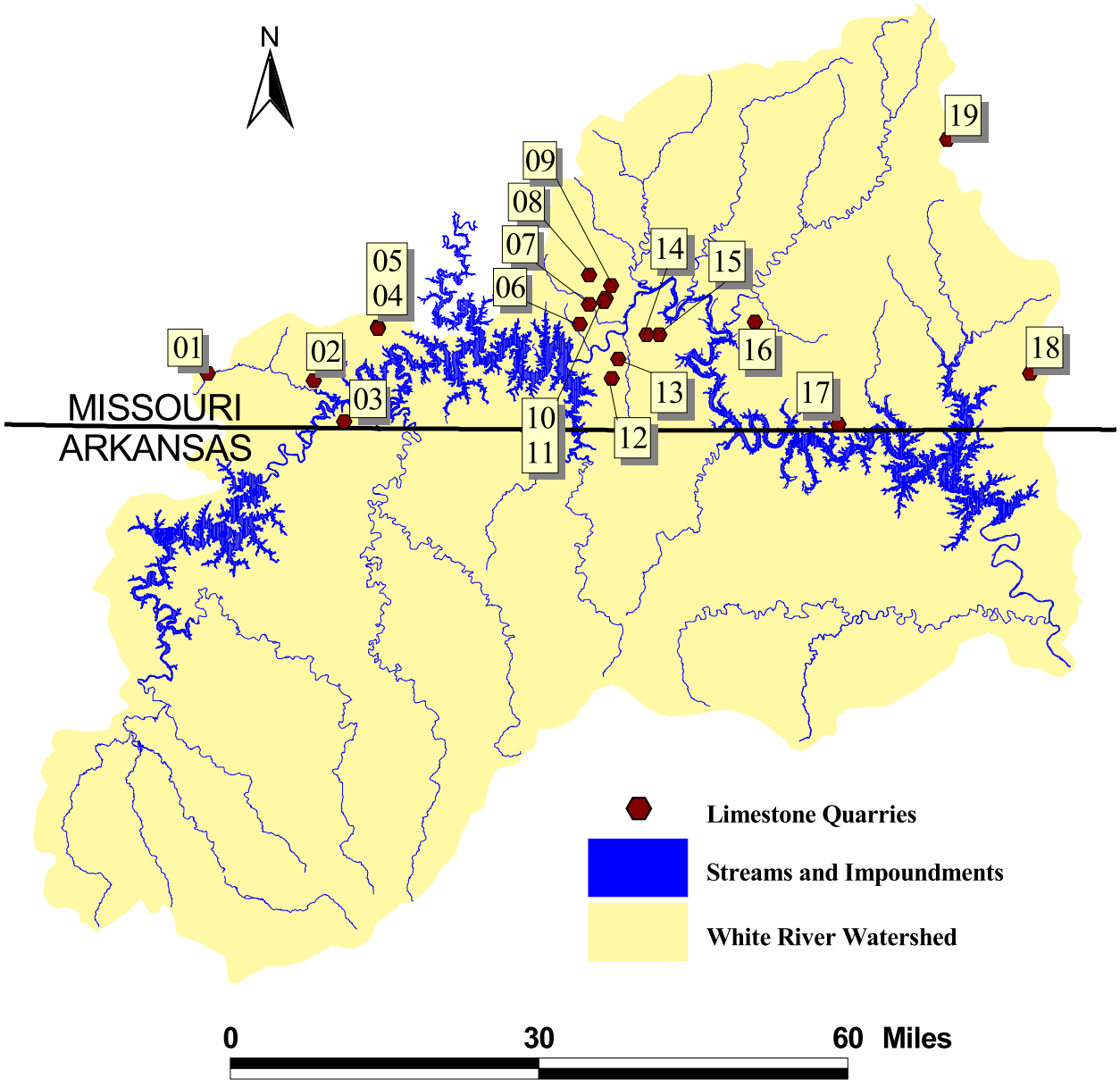
Figure LU02. Known gravel removal locations in the White River watershed.



Note: Location numbers reference Table LU05.

Source: USCOE (1998).

Figure LU03. Limestone quarries in the Missouri portion of the White River watershed.



Note: Limestone quarry numbers reference Table LU06. Source: NPDES database (MDNR 1998b)

Figure LU04. Public areas in the Missouri portion of the White River watershed.

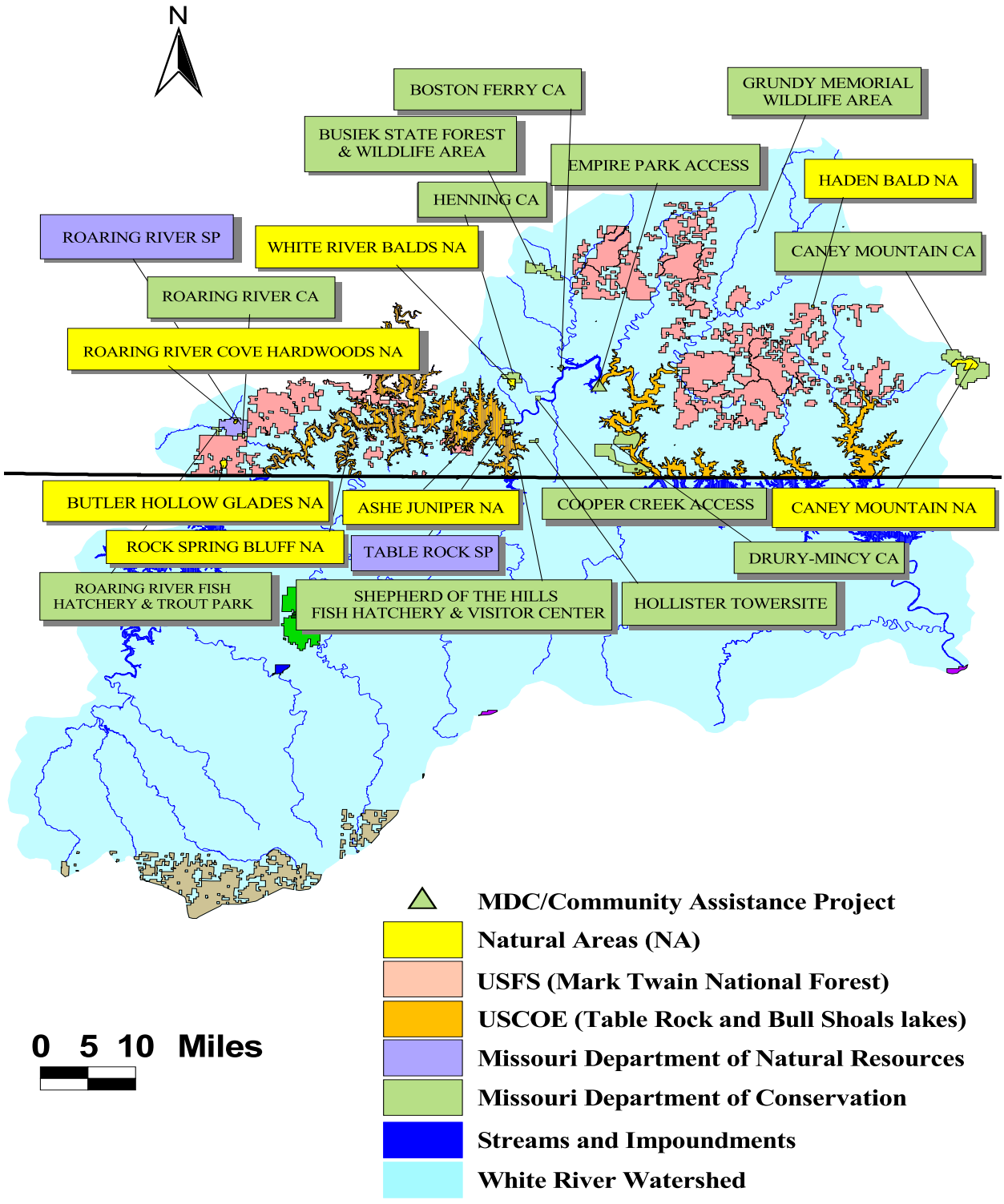
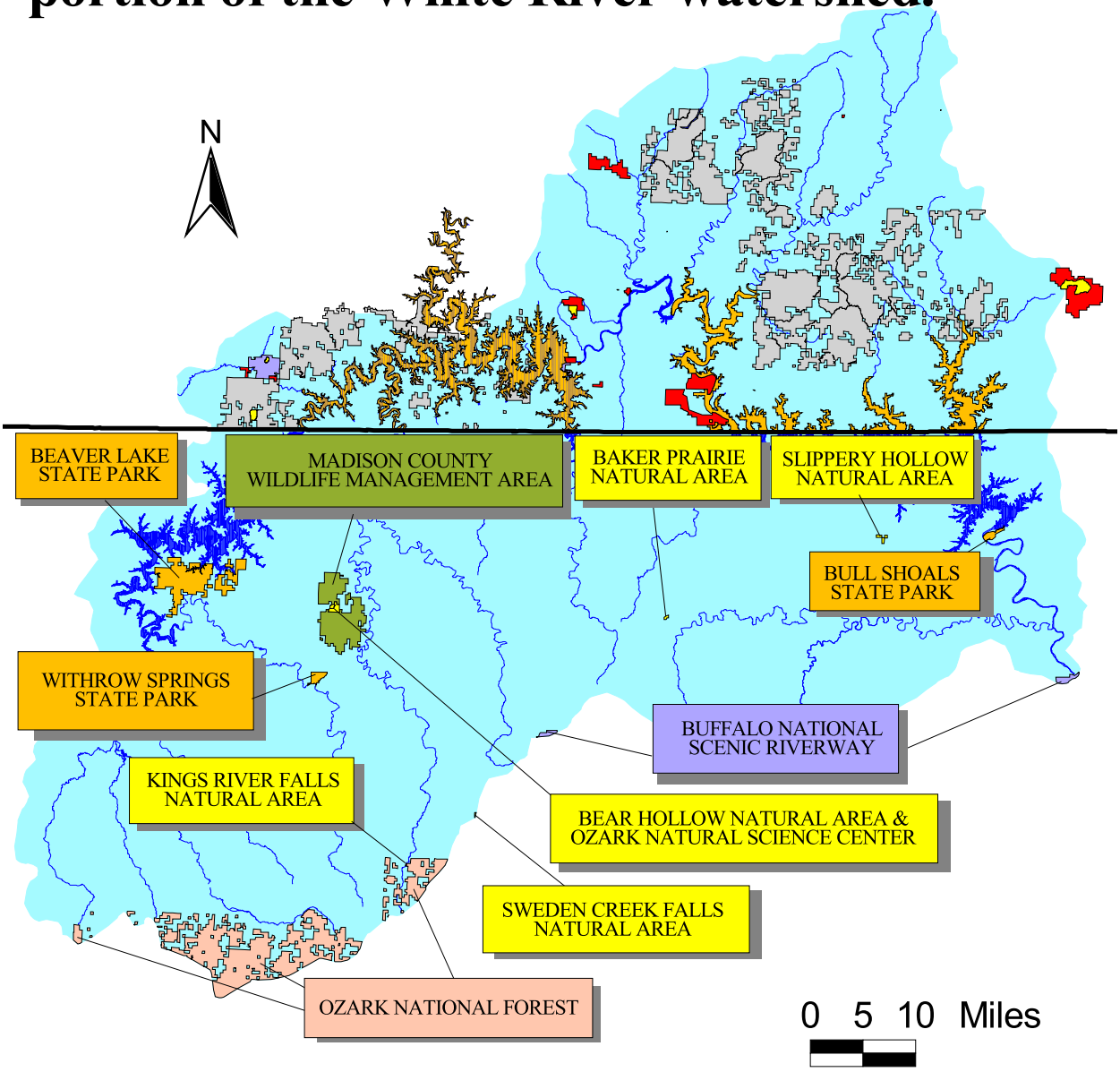


Figure LU05. Public areas in the Arkansas portion of the White River watershed.



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ARKANSAS NATURAL HERITAGE COMMISSION
ARKANSAS DEPARTMENT OF PARKS AND TOURISM
USFS
UNITED STATES NATIONAL PARKS SERVICE
Streams and Impoundments
White River Watershed

Source: Smith et al.(1998)